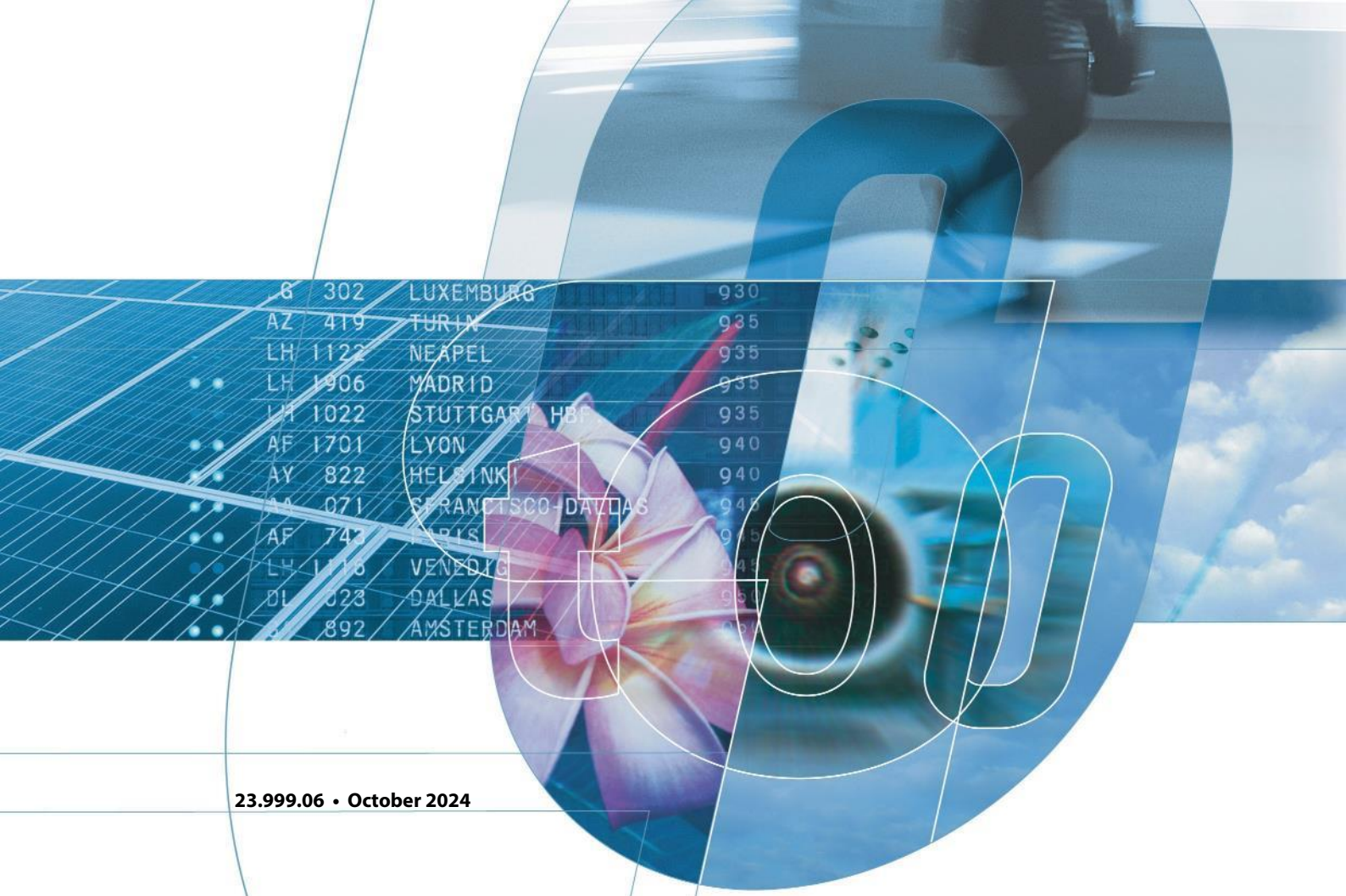

23.999.06 • October 2024

A-CDM Performance Framework

CANSO A-CDM ATFM Work Group

Aviation Consultants

A-CDM Performance Framework

CANSO A-CDM ATFM Work Group

Report

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1 Introduction

Airport CDM is a concept developed by Eurocontrol since 2000's for purpose of reducing ground delays on airports by enhancing efficiency in turnround operations. Since 2007 40+ European airports exchange flight information with the Network Manager Operations Centre (NMOC) aimed to minimise ATFM delays. European airports have been mandated to implement through EU regulations. ACDM is a pre-requisite for Airport – Network Integration (ANI) in Europe, whilst its data is used for ATFM purpose in APAC region.

Since its global endorsement by ICAO in the Global Air Navigation Plan (GANP), airports across all continents have begun to implement ACDM. These implementations, however, often declare implementation but don't define benefits, and rely on non-standard reporting mechanisms to define the operational performance.

To standardise implementations and clearly define the performance of ACDM Implementations at airports across diverse environments, a global standard framework that verifies operational performance, is required that includes standard reporting in key performance areas including efficiency, punctuality, predictability and economy.

This document describes a standardised global framework for accrediting ACDM implementations based on the performance of each implemented model.

1.1 Background

This document is initiated after the decision was taken by the CANSO A-CDM ATFM Work Group on 11 July 2023 in Legian, Bali, Indonesia to create an ACDM Performance Framework. On 26 September 2023 the kick-off of this subgroup took place online. This document is the result of the work in that subgroup.

1.2 Scope

This document defines a framework for ACDM performance management, that has been developed by CANSO through its A-CDM ATFM Work Group in collaboration with the International Council of Airports (ACI) and the International Air Transport Association (IATA) through their related ACDM work groups.
The framework consists of two elements;

- A method of measuring ACDM performance
- An accreditation program which is intended to recognise the level of performance of the ACDM operation at a given airport.

The purpose of involving ACI and IATA is to ensure a global approach that is supported by all stakeholders that participate and receive benefit from ACDM implemented at airports.

1.3 Audience

Audiences of this ACDM Performance Framework are amongst others:

1. Performance managers responsible for setting up performance management at their ANSP or Airport, and reporting to international ACDM stakeholders;

2. Quality Managers who are responsible for accreditation of their airport as CDM Airport;
3. Executives who aim to steer their airports or ANSP on performance and aim for enhancements;
4. Customers who use the ACDM operation at a given airport
5. Stakeholders who support the ACDM operation

1.4 Structure

This chapter references the document to its owners, its reason for existence, purpose, audience, background and structure. This document contains the description of a performance framework and a model for its use to accredit airports.

This document is structured as follows:

Chapter **Error! Reference source not found.**~~2~~ describes Justification, assumptions and methodology
Chapter 3 describes the Framework and Level Status
Chapter **Error! Reference source not found.**~~4~~ describes Performance Objectives, Drivers and Indicators
Chapter
Chapter

Annex A describes relevant reference documents
Annex B describes acronyms

2 Context and Background

The purpose of this chapter is to set the context and background for this performance framework. It contains sections to explain:

- Justification
- Expected benefits
- Objectives
- Scope
- Assumptions
- Dependencies

2.1 Justification

The aviation industry is already supported by many performance frameworks that span the breadth of aviation activities including airport performance, ANSP performance, and airline performance.

Most of the frameworks that apply to airport operational efficiency are ATM-based models such as;

- CANSO Guidelines on ACDM Key Performance Measures (2019) (reference 5),
- SESAR Performance Framework (PJ19.04), v1.00,
- Eurocontrol 2019 (reference 8), and
- Network Manager Performance Framework (NOP Portal) (reference 9).

These performance frameworks focus more on the performance areas of punctuality, capacity, cost-effectiveness or productivity of the operation. . A summary of those elements broadly relevant to ACDM are listed in Annex A ~~A.~~

While there are many performance frameworks already in existence, the reason for establishing this framework lies in the limitation of the existing frameworks.
Examples of the limitations are discussed below:

- ICAO reporting on ACDM limits discussion to those of efficiency and capacity KPI's that involve air-related flight performance. It does not address surface or airport resource issues.
- CANSO guidelines more closely align to general ACDM principles, but current performance reports are limited to ANS safety, cost efficiency and productivity
- IATA is generally airline focussed, and reporting is broadly limited to measuring flight times and cost efficiency related to fuel consumption
- SESAR reporting does not monitor Turn-around efficiency or the predictability of pushback times
- There is limited detail on Ground Handlers and Airport Efficiency performance in any frameworks

In general, KPA's and KPI's are mostly oriented to in-flight operations, or ATM system operations and pay less or no attention to ground resource planning.

In Figure 1 below, the existing frameworks are mapped into performance areas. In this figure, performance areas such as Safety, Environment, Sustainability are left out for practical purposes, providing focus on the relevant performance areas.
Figure 1, is intended to illustrate that existing frameworks tend focus on punctuality, and capacity and leave assessments in the areas of efficiency/predictability mostly void.

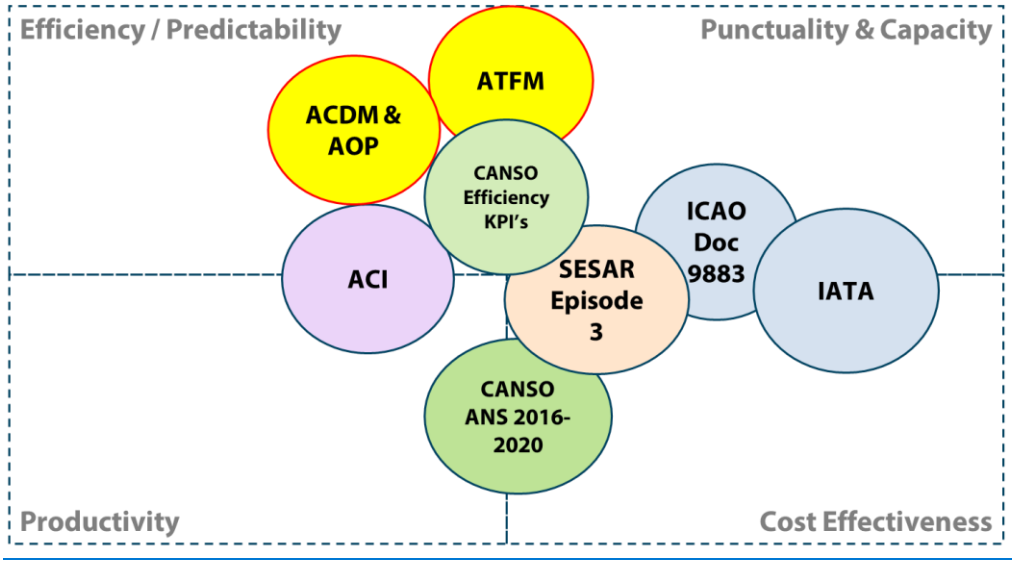


Figure 1 - Mapping Current Performance Frameworks

ACDM processes are specifically designed to enhance operational efficiency using prediction of flight milestones prior to, during and after the turn-around process. Existing frameworks broadly fail to address the most important performance areas of efficiency and predictability.

This is where the proposed Airport CDM performance framework finds its justification.

2.2 Expected Benefits from a standard Performance Framework

The Eurocontrol ACDM model defines the measurement of ACDM performance in terms of Strategic Objectives, Business Drivers, Key Performance Indicators (KPI) and Metrics. These four elements seek to define the way in which the objectives of an ACDM user are visualised by their business drivers, and tracked by KPI using agreed metrics.

A simple example is the objective of achieving operating punctuality – visualised through the two business drivers of arrival punctuality and departure punctuality. The KPI for arrival is the time that the aircraft arrives at the parking location (AIBT). The metric for this KPI is the time the aircraft arrives at the parking location, compared to the time the aircraft was planned to arrive there (AIBT-EIBT).
These elements and the way that they align to this framework are discussed in detail at Section F 1

2.2.1 Broad benefits

Direct and indirect long-term benefits will flow to all aviation stakeholders, their passengers and customers who are involved at any level of ACDM operation.
This framework is intended to enhance the likelihood of achieving benefits by establishing the fundamental basis for continual performance improvement, defining a baseline requirement and a target for improvement. The way in which this is achieved is discussed at Section E ~~E.~~

An ACDM Performance Framework will deliver:

- global, harmonized standards on performance reporting, steering, monitoring and management, enabling performance comparison.
- a recognised model for airports to achieve and sustain international recognition of operational performance
- Consistent opportunity for airports to enhance local performance using standardised airport performance models.
- Enabler of international integration of information and data exchanges based on standard performance indicators and specifications

2.2.2 Specific benefits

Stakeholders participating in ACDM at a specific airport that participates in standard ACDM performance framework, can be expected to realise the following benefits:

Airports

Airports can expect to earn prestige and international recognition by demonstrating levels of ACDM performance that may improve their commercial offerings to their clients. The Framework will also recognise their demonstrated ability to provide an efficient, delay-minimised airport operation for their customers and the traveling community.
As the Framework will facilitate performance improvement, they can expect to realise resource allocation efficiencies such as better stand and gate management and will be better empowered to manage and recover from periods of adverse conditions.

Airlines

Airlines can expect to earn prestige and international recognition by demonstrating that they are participating in an accredited ACDM operation. As the Framework will facilitate performance improvement, they can expect to realise expected fuel savings, Improved ATFM slot adherence despite increased traffic demand, and reductions in taxi times that can bring network predictability and enhance On-Time Performance (OTP). They will be better empowered to manage and recover from periods of adverse conditions.

Ground Handlers

Ground Handlers can expect to earn prestige and international recognition by demonstrating that they are participating in an accredited ACDM operation. As the Framework will facilitate performance improvement, they can expect to realise efficient resource utilisation for their heavy equipment, will be

better empowered to plan staff management, and enhanced ability to manage and recover from periods of adverse conditions

ANSP

~~Ground Handlers~~ANSP can expect to earn prestige and international recognition by demonstrating that they are participating in an accredited ACDM operation. As the Framework will facilitate performance improvement, they can expect to realise reduced workload and better predictability of when traffic levels require additional resources to manage them.

This ability to predict and manage traffic movements will have flow on effects to the network enabling accurate prediction of airborne traffic operations and enhanced Air Traffic Flow Management (ATFM) capabilities.

They will also have an enhanced ability to manage and recover from periods of adverse conditions both on the airfield and in other areas of the network.

2.3 Objectives

Building on the expected benefits, the main objectives for an ACDM performance framework are the:

1. Provide a mechanism for the realisation of the promised benefits of implementing ACDM and a model for recognising the energy and effort undertaken to achieve these beneits by all participating stakeholders.
2. education of all airport operations stakeholders to develop operational improvement enhancing performance
    a. Local airport stakeholders
    b. Network / Region
3. education of Aviation Community on ways to exchange knowledge on global scale using:
    a. standard references for performance reporting
    b. Steering and performance management processes
4. ability to verify and account for the cost to stakeholders of implementing ACDM at an airport allowing Business Case verification and benefit realisation
5. enabling of effective governance of the ACDM implementation by:
    a. incentivising stakeholder behaviour
    b. enabling standard monitoring and management
    c. providing accurate data to support Stakeholder Service Level Agreements

2.4 Scope

To achieve the objectives set out in previous section 2.3 the scope of the framework is limited to performance areas of Efficiency and Predictability key elements of behaviour and performance change. This leaves out performance areas of punctuality or capacity and sustainability or environment, and safety, which are all consequently impacted by changes in efficiency.

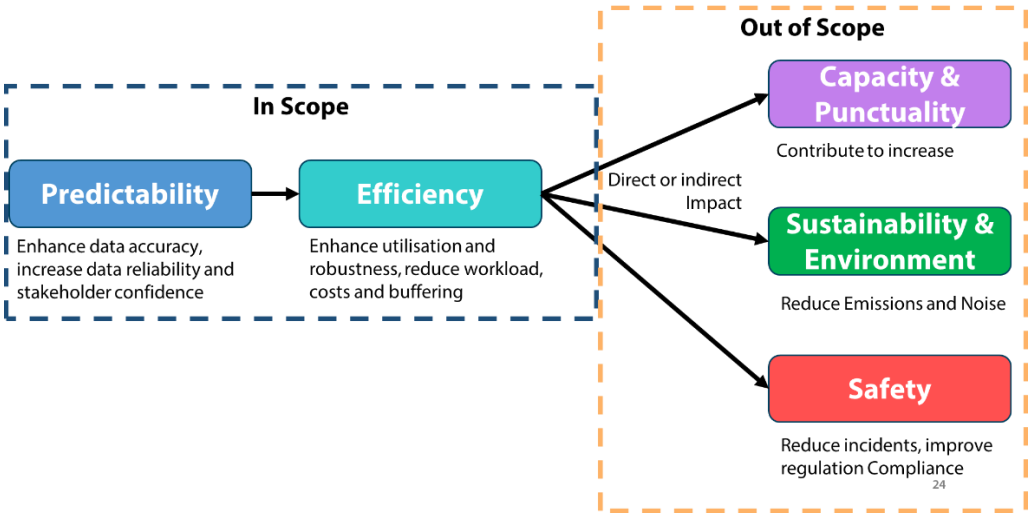


Figure 2 – impact of Predictability and Efficiency on Safety, Punctuality and Environment

By focussing on predictability and efficiency, the framework described herein is complementary to existing Performance Frameworks.
The framework is designed specifically to cater for all levels of airports with ACDM implementations and incorporates ATFM integration where available.
It must be noted that to be successful, the framework must accommodate airports at all levels of implementation and that some airports may elect to remain at a level rather than seek to continue to enhance operations, where it is appropriate to do so.

2.5 Requirements to Performance Framework

An ACDM performance framework requires, guiding principles or requirements are warranted. In building this framework, the requirements have been drawn from the basic ACDM concept, where multiple stakeholders are enabled to collaborate, and exchange flight data over automated interfaces with the purpose of enhancing operations and generate benefits.

From the ACDM concept with its roots in the Eurocontrol ACDM implementation manual (reference 4), the principles are:

1. Harmonized →Learning best practices when results are comparable
2. Transparent → Enable global trend of learning and knowledge exchange
3. Balanced → Weighing different stakeholder performance interests
4. Feasible →For airport and ANSP's to rapidly create reporting based on existing and common data sources
5. Available → more data sources are needed and agreed by local stakeholder to source common data sharing and comparison of performance
6. Complementary → Uncovered Performance Areas – no need to reinvent the wheel

2.6 Assumptions

To understand and apply a standard performance framework, it makes sense to understand the assumptions and perspectives that lie underneath.

2.6.1 Impact of data on operational decision making

Operations depend highly on human decision making. Prior and during the turnaround process where the aircraft is arriving, handled and departing, many decisions are being made by multiple stakeholders dependent on many factors and relying heavily on actuality and accuracy of available data.

When data is considered accurate, it may be considered reliable information where decisions are based on. This relation is visualised in Figure 3~~Figure 1~~ and while it may seem obvious need to be stated for understanding the value of data when its accuracy is less certain.

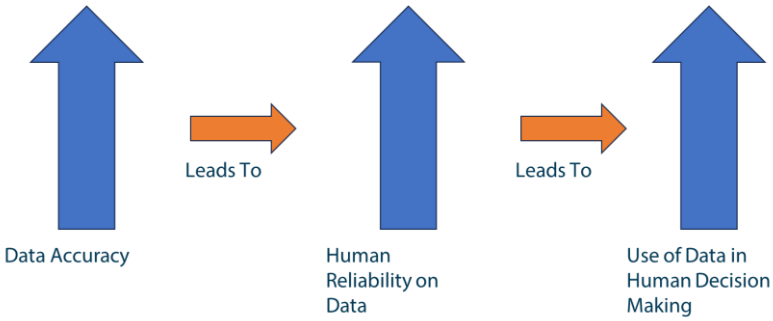


Figure 3 – Accurate data increases use of data in decision making

As example for data considered to be highly accurate with zero uncertainty, the pilot fully relies on altitude and heading instructions by air traffic control and steers the aircraft accordingly. There is no doubt on the received information, since this is highly safety critical. There is no doubt either when a gate and taxiway is communicated to the pilot, the instruction is followed.

Similar though slightly certainty is there in radar data recorded by infrastructure about positioning of aircraft and vehicles, whether in air on ground. Air Traffic controllers decide their actions and instructions assuming full accuracy of the radar plots they have in their screens. So, they are trained to providing safety.

Less certain is the information used in functions aimed at prediction of events. Arrival Management functions use radar and flight data, even trajectory

2.6.2 Difference between Predictability and Punctuality

In many organisations the strategic objective of predictability is perceived to be the same as punctuality, which should be made clear it is not. There is a need for understanding the differences between punctuality and predictability for clarity of benefits, strategic objectives and performance steering. Annex C describes the definitions and differences in detail.

The difference between predictability and punctuality is essential to understand the need for different set of business drivers and performance indicators, as well as targets for steering. This difference will be visible and used throughout this document.

2.6.3 Tolerances

Value accuracy is defined by adherence to agreed and standardized tolerances on target values. For stakeholders to compare performance indicators such adherence to tolerances on target values needs to be defined and standardized.

Examples are the tolerances on Target Off-Block Time (TOBT) of five minutes, or the tolerance on Target Start-up Approval Time (TSAT) of 3 minutes. While the tolerances may vary per airport, for comparison an international standard needs to be agreed for each Level Status.

2.7 Dependencies

To stand long term, CANSO Airport CDM & ATFM Performance Framework should be:

- Carried, co-sponsored or supported by ACI
- Endorsed by ANSP's, FAA, Eurocontrol Network Manager, and ATFM organisations
- Endorsed/ Adopted by IATA/ICAO

2.8 Alignment

Describe which international entities have a common interest, including ICAO, IATA, ACI, CANSO supported by main continental institutions such as FAA, Eurocontrol NM, etc.

2.9 Global Harmonization

Describe the global need for harmonization of common objectives related to operational efficiency at airports. Add examples.

3 Framework Model

This chapter describes the framework model for assigning status levels and accrediting airports according to their Airport CDM performance. It describes:

- Concept
- Principles
- Organisation
- Criteria to enter and exit
- Reporting requirements

3.1 Concept to award performance improvement accreditation

Airports with ACDM implementations will be encouraged to submit report through an on-line portal, providing the level of information they have available. Successful entry of data will provide candidate airports with an expectation of the level of accreditation they will achieve.

There are three key stakeholders in the accreditation process:

- Candidate ACDM Airports seeking accreditation
- A consultancy firm that conducts the accreditation process
- An ACDM Accreditation Board that oversees the accreditation process.

These are discussed in detail in the section below.

3.2 Principles

The following principles are the foundation of the performance framework and define level status:

- Level Status is a set of levels that provides status to accredited airports.
- Level Status is allocated when an airport meets the level status requirements
- Any airport meeting the entry criteria can qualify for Level Status recognition.
- The ACDM Accreditation Board is the authority under a joint CANSO-ACI-IATA agreement that determines criteria for recognition and assigning Level Status for each qualified airport
- Airports should be recognized for joining and continuing accreditation
- Airports can increase A-CDM Level Status by:
    - Broadening the depth and range of reported performance indicators
    - Connecting and sharing ACDM data to Domestic or Regional ATFM Centre
    - Enhancing the accuracy of their predictions
- Airports can reduce A-CDM Level Status
- Involvement of local stakeholders should be recognised in the Level Status.
- The performance framework is a voluntary accreditation

3.3 Criteria

There are criteria to enter, maintain and exit accreditation for airports.

3.3.1 Entry

The following Entry Criteria need to be considered for formal entrance and recognition:

1. An airport submits an ACDM report for Level Status recognition
2. The report is assessed and verified
3. Successful candidates are endorsed, notified, published on the ACDM Accreditation website

4. Unsuccessful candidates are notified

.

3.3.2 Maintain

Accredited airports must submit reports annually to remain accredited.
Accredited airports which have successfully renewed three years running may reduce reporting to very third year.

3.3.3 Exit

Airports will be exited from accreditation when:

5. The airport suspends or requests termination, or
6. The airport does not report for two reporting periods in row,

3.4 Level Status

Figure 4 below shows a schematic hierarchy of the four levels of the A-CDM performance framework.

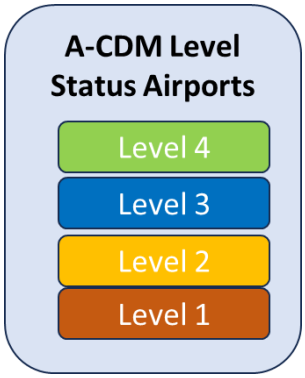


Figure 4 – Four categories of Level Status

Higher Level Status means more information sharing, more stakeholder connectivity, and more accuracy of operational performance. The four levels are categorized as follows:

- Level 1 – Information Sharing
  - Availability and Stakeholder sharing of TOBT, TSAT and TTOT
  - Reporting Basic Metrics
- Level 2 – Outbound & Arrival Planning
  - Availability of PDS or DMAN determining TSAT and TTOT
  - Availability of AMAN determining ELDT, EIBT
  - Reporting Enhanced set of Metrics
  - Meeting Tolerances Cat 1
- Level 3 – Airport Connection to ATFM Centre
  - Connection to domestic ATFM centre
  - Meeting Tolerances Cat 2
- Level 4 – Highest Accuracy & Reliability
  - Connection to international or regional ATFM centre

- Reporting Enhanced set of Metrics
- Meeting Tolerances Cat 3

Different categories of performance indicator tolerances determine higher accuracy requirements of the performance. Initial categories of performance indicators are determined in Annex Y.

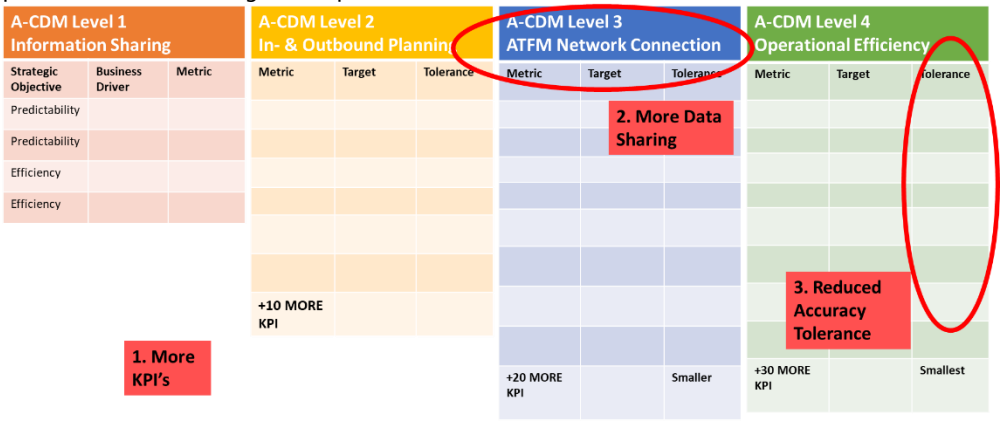


Figure 5 – Performance Framework Model

3.4.1 Level Status Criteria

The criteria for achieving an ACDM level status include KPI, that are aligned to KPA, Business Drivers and Strategic Objective. The Framework level status criteria are listed in Annex C

3.5 ACDM Accreditation Organisation

For the administration of ACDM accreditation, a model needs to be established that is reliable and consistent with standard procedures for all participants. Figure 6 below shows the organisation and process flow for determining Level Status.

Candidate airports wishing to become accredited will:

- will submit a report
- pay a fee upon submission that will cover the cost of:
  - The data capture
  - The assessment of ACDM status
  - Reporting and assignment of ACDM level status

An independent consultancy will be established to conduct the accreditation process with the following key tasks:

- maintain the ACDM Accreditation website
- process applications submitted through the website and conduct verification activities
- provide validated recommendations to the ACDM Accreditation Board for endorsement.
- be remunerated for conducting these activities

An ACDM Accreditation Board will be established to oversee the accreditation process with the following constituency:

- Chair (Canso Benchmarking committee)
- IATA ACDM Vice President (VP)
- ACI ACDM Vice President (VP)
- CANSO ACDM Vice President (VP)
- Independent consultant secretariat and ACDM expert.

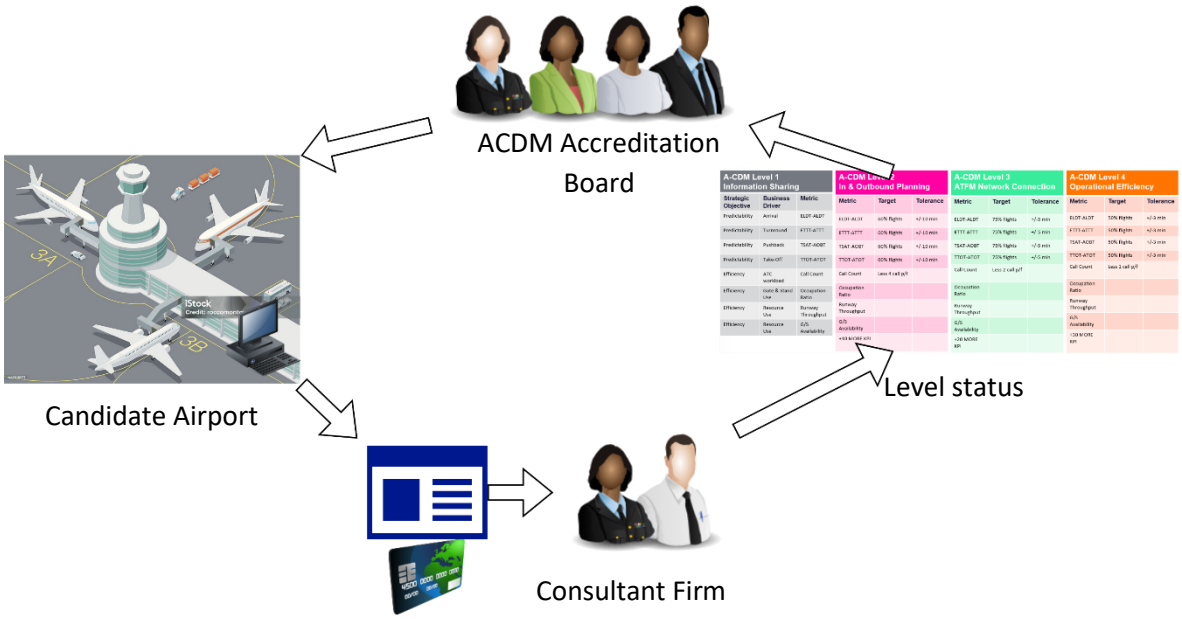


Figure 6 – ACDM Accreditation Organisation and workflow

The organisation is jointly responsible for execution of multiple primary and secondary processes. In the sections below some primary processes are described.

3.5.1 Workflow

The Accreditation process shall follow the basic workflow below:

This process shall include:

1. Establish and maintain an ACDM Accreditation Website similar to the ACA Carbon Accreditation Website
2. Receive candidate airport report through the website. The report should be standardized for each level status as described in
3. Receive payment for the accreditation assessment.
4. Conduct validation of the report and confirm level status for the candidate airport
5. Advise the airport of any failure to achieve status recognition or
6. Provide a recommendation for level status accreditation to the ACDM Accreditation Board

7. Review the recommendation and endorse or reject
8. Advise the airport of the outcome of the process
9. Publish the airport level status if appropriate
10. Review the entry and level assessment criteria on a regular basis
11. Monitor accredited airports for status changes/reporting

3.6 Reporting Requirements

Level Status airports must maintain their reporting to avoid meeting the Exit Criteria as described in section 3.3. Reports need to be:

- Sent annually or as per their requirement
- In the agreed Standard Format with all elements completed
-

Level Status requirements shall be kept in a separate document, to be maintained by the Consultant and reported to the ACDM Accreditation Board as required.

A References

A list of international performance frameworks and local airport performance reports can be found in this annex.

A 1 International Performance Frameworks

This is a list of related documents:

1. Doc 9883 Manual on Global Performance of the Air Navigation System on Performance Framework
2. Doc 9750 Global Air Navigation Plan (GANP)
3. Doc 9971Manual on Collaborative Decision Making (CDM)
4. Eurocontrol Airport CDM Implementation Manual, 2017
5. CANSO Guidelines on ACDM Key Performance Measures (2019)
6. CANSO 2015 Performance Framework
7. Global ANS Performance Report 2016-2020
8. SESAR Performance Framework (PJ19.04), v1.00, Eurocontrol 2019
9. Network Manager Performance Framework (NOP Portal)
10. Episode 3 – Performance Framework v3.06– Eurocontrol Experimental Centre, 2009

Add more references on performance framework methodology as well as accreditation methodology.

A 2 Airport ACDM Performance Reports

1. ACDM Germany Annual Report 2021 – DFS Deutsche Flugsicherung GmbH 2022, 2022
2. ACDM KPI's Hong Kong Airport – CAD, 2023

B Acronyms

This table contains the acronyms and definitions in line with the Eurocontrol ACDM implementation manual.

Acronym	Definition	Description
ACARS	Aircraft Communications Addressing and Reporting System	
ACC	Area Control Centre	
ACGT	Actual Commence of Ground Handling Time	The time when ground handling on an aircraft starts, can be equal to AIBT
ACISP	ACDM Information Sharing Platform	
ADEP	Aerodrome of Departure	
ADES	Aerodrome of Destination	
ADEXP	ATS Data Exchange Presentation	ADEXP provides a format for use primarily in on-line, computer to computer message exchange. ADEXP is a format, not a protocol.
ADIT	Actual De-icing Time	Metric: AEZT – ACZT
A-DPI	ATC-Departure Planning Information message	DPI message sent by the CDM Airport to NMOC (ETFMS), notifying the TTOT between ATC time of pre-departure sequencing and ATOT
AFTN	Aeronautical Fixed Telecommunication Network	
AGHT	Actual Ground Handling Time	The total duration of the ground handling of the aircraft. Metric ACGT - AEGT
AIBT	Actual In-Block Time	The time that an aircraft arrives in blocks. (Equivalent to Airline/Handler ATA –Actual Time of Arrival, ACARS = IN).
ALDT	Actual Landing Time	The time that an aircraft lands on a runway. (Equivalent to ATC ATA – Actual Time of Arrival = landing, ACARS=ON).
AMAN	Arrival Manager	
ANSP	Air Navigation Service Provider	
AO	Aircraft Operator	

AOBT	Actual Off-Block Time	Time the aircraft pushes back / vacates the parking position. (Equivalent to Airline / Handlers ATD – Actual Time of Departure & ACARS=OUT)
ARDT	Actual Ready Time (for Movement)	When the aircraft is ready for start-up/push back or taxi immediately after clearance delivery, meeting the requirements set by the TOBT definition
ARR	Arrival	Inbound flight
ASAT	Actual Start- Up Approval Time	Time that an aircraft receives its Start-up approval. Note: the moment the start-up approval is given can be in advance of the TSAT (e.g. via datalink)
ASBT	Actual Start Boarding Time	Time passengers are entering the bridge or bus to the aircraft
A-SMGCS	Advanced Surface Movement Guidance and Control System	System at airports having a surveillance infrastructure consisting of a Non-Cooperative Surveillance (e.g. SMR, Microwave Sensors, Optical Sensors etc) and Cooperative Surveillance (e.g. multi-lateration systems)
ASRT	Actual Start-Up Request Time	Time the pilot requests start up clearance
ATC	Air Traffic Control	
ATFCM	Air Traffic Flow and Capacity Management	ATFM extended to the optimisation of traffic patterns and capacity management. Through managing the balance of capacity and demand the aim of ATFCM is to enable flight punctuality and efficiency according to the available resources with the emphasis on optimising the network capacity through Collaborative Decision-Making process. (NMOC Handbook ATFCM_ Operating_Procedures_for_FMP_1.0)
ATFM	Air Traffic Flow Management	A service established with the objective of contributing to a safe,

		orderly and expeditious flow of air traffic by ensuring that air traffic control capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate Air Traffic Services authority. (ICAO Annex 11, Chapter 1)
ATM	Air Traffic Management	Management of the demand for, and the use of airspace
ATOT	Actual Take Off Time	The time that an aircraft takes off from the runway. (Equivalent to ATC ATD–Actual Time of Departure, ACARS = OFF).
ATS	Air Traffic Services	
C-DPI	Cancel - Departure Planning Information message	This message informs NMOC that previously sent DPI is no longer valid.
CHG	Change Message	Standard message sent to NMOC to change flight plan data
CNL	Flight Plan Cancellation	Standard message sent to NMOC to cancel a flight plan
CTOT	Calculated Take Off Time (CFMU)	A time calculated and issued by the appropriate Central Management unit, because of tactical slot allocation, at which a flight is expected to become airborne. (ICAO Doc 7030/4 – EUR, Table 7)
DCL	Departure Clearance (Datalink)	
DEP	Departure	Outbound flight
DLA	Delay message	Standard message sent to NMOC to delay flight plan OBT
DMAN	Departure Manager	DMAN is a planning system to improve the departure flows at an airport by calculating the Target Take Off Time (TTOT) and Target Start up Approval Time (TSAT) for each flight, taking multiple constraints and preferences into account

DPI	Departure Planning Information message	Message from Airport to NMOC. See also A-DPI, C-DPI, E-DPI, T-DPI
EDIT	Estimated De-icing Time	Metric: EEZT – ECZT
E-DPI	Early - Departure Planning Information message	First DPI message that is sent from the CDM Airport to the NMOC (ETFMS) notifying the TTOT.
EET	Estimated Elapsed Time	The estimated time required to proceed from one significant point to another (ICAO)
EIBT	Estimated In-Block Time	The estimated time that an aircraft will arrive in blocks. (Equivalent to Airline/Handler ETA –Estimated Time of Arrival).
ELDT	Estimated Landing Time	The estimated time that an aircraft will touchdown on the runway. (Equivalent to ATC ETA –Estimated Time of Arrival = landing).
EOBT	Estimated Off-Block Time	The estimated time at which the aircraft will commence movement associated with departure (ICAO). (Equivalent to Airline / Handlers ETD – Estimated Time of Departure)
ETFMS	Enhanced Tactical Flow Management System	ETFMS receives radar derived data provided by the Air Navigation Service Providers (ANSPs), position report data provided by the Aircraft Operators and meteorological data. ETFMS uses this data to update the existing data coming from flight plans and flow measures
ETO	Estimated Time Over	
ETOT	Estimated Take Off Time	The estimated take off time considering the EOBT plus EXOT.
ETTT	Estimated Turn-round Time	The time estimated by the AO/GH on the day of operation to turn-round a flight considering the operational constraints
EXIT	Estimated Taxi-In Time	The estimated time between landing and in-block
EXOT	Estimated Taxi-Out Time	The estimated time between off-block and take off
FIDS	Flight Information Display System	

FIR	Flight Information Region	
FMP	Flow Management Position	Provides a vital flow of information from their operational ATC Unit to NMOC about the current situation within their ACC and the operational situation at the airport
FPL	Filed Flight Plan	ICAO derived flight plan
FRD	Functional Requirements Document	This document specifies the minimum set of requirements to implement ACDM
FSA	First System Activation	
FUM	Flight Update Message	A message sent from NMOC to a CDM Airport providing an ELDT, ETO and flight level at the last point of route
GH	Ground Handler	Company responsible for handling of aircraft during turn-round at the airport
ICAO	International Civil Aviation Organization	
IFPS	Integrated Initial Flight Plan Processing System	A system of NMOC designed to rationalise the reception, initial processing and distribution of IFR/GAT flight plan data related to IFR flight within the area covered by the participating States. (ICAO Doc 7030/4 – EUR, paragraph 3.1.1 new)
IFR	Instrument Flight Rules	
LRWY	Landing Runway	The runway that will be used by an aircraft to land
MTTT	Minimum Turn-round Time	The minimum turn-round time agreed with an AO/GH for a specified flight or aircraft type.
MVT	Movement message	Standardised IATA format message, sent via SITA to destination airport, AO and other recipients, containing departure data of a flight
NM	Network Management	
OCD	Operational Concept Document	
PDS	Pre-Departure Sequencer	Sequencer function to be managed by ATC TWR.
REA	Ready message	

RWY	Runway	
SAM	Slot Allocation Message	
SIBT	Scheduled In-Block Time	The time that an aircraft is scheduled to arrive at its parking position.
SID	Standard Instrument Departure	Published flight procedures followed by aircraft on an IFR flight plan immediately after take-off from an airport
SLC	Slot Cancellation message	Standard message from NMOC sent when a previously allocated CTOT is cancelled
SOBT	Scheduled Off-Block Time	The time that an aircraft is scheduled to depart from its parking position.
SRM	Slot Revision Message	Standard message from NMOC sent when a previously allocated CTOT is revised
TBD	To Be Defined	
T-DPI-s	Target - Departure Planning Information message - sequenced	This DPI message is sent from the CDM Airport to the NMOC (ETFMS) notifying the Target Take Off Time based on the TSAT
T-DPI-t	Target - Departure Planning Information message - target	This DPI message is sent from the CDM Airport to the NMOC (ETFMS) notifying the Target Take Off Time based on the TOBT
TOBT	Target Off-Block Time	The time that an Aircraft Operator or Ground Handler estimates that an aircraft will be ready, all doors closed, boarding bridge removed, push back vehicle available and ready to start up / push back immediately upon reception of clearance from the TWR
TRWY	Take-off Runway	The runway that will be used for an aircraft to depart from
TSAT	Target Start-Up Approval Time	The time provided by ATC considering TOBT, CTOT and/or the traffic situation that an aircraft can expect startup / push back approval
TTOT	Target Take Off Time	The Target Take Off Time considering the TOBT / TSAT plus the EXOT.
TWR	Aerodrome Control Tower	

VTT	Variable Taxi Time	The estimated time that an aircraft spends taxiing between its parking stand and the runway or vice versa. Note: Variable Taxi Time is the common name for inbound (EXIT) and outbound (EXOT) taxi times, used for calculation of TTOT or TSAT.

C Level status criteria

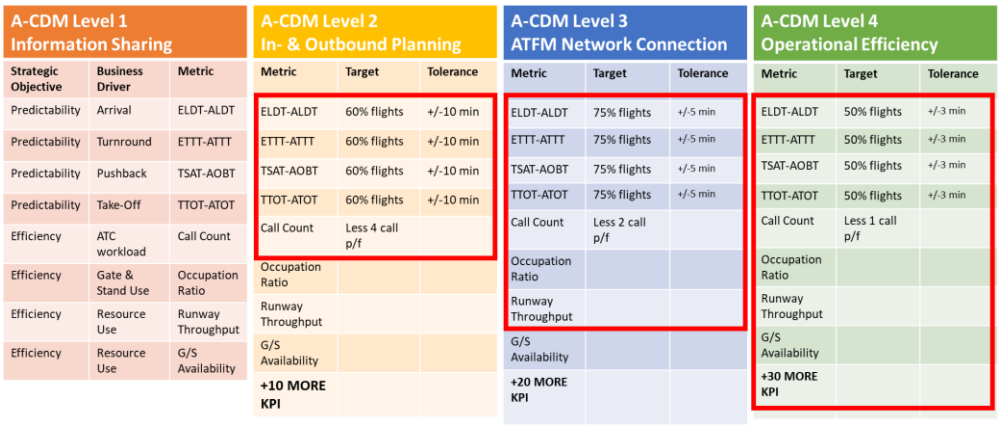
Figure 7~~Figure 9~~ below describes the four levels of ACDM Accreditation.

In Level 1- Information Sharing, metrics are required but no targets or metrics are set.

In Level 2- KPI metrics, targets, and tolerances are introduced that are specific to the In and outbound planning processes.

In level 3- KPI metrics, targets, and tolerances are introduced that are specific to the ATFM network connectivity

In Level 4 – new KPI are introduced that target operational efficiency.



A-CDM Level 1 Information Sharing		
Strategic Objective	**Business Driver**	**Metric**
Predictability	Arrival	ELDT-ALDT
Predictability	Turnround	ETTT-ATTT
Predictability	Pushback	TSAT-AOBT
Predictability	Take-Off	TTOT-ATOT
Efficiency	ATC workload	Call Count
Efficiency	Gate & Stand Use	Occupation Ratio
Efficiency	Resource Use	Runway Throughput
Efficiency	Resource Use	G/S Availability

A-CDM Level 2 In- & Outbound Planning		
Metric	**Target**	**Tolerance**
ELDT-ALDT	60% flights	+/-10 min
ETTT-ATTT	60% flights	+/-10 min
TSAT-AOBT	60% flights	+/-10 min
TTOT-ATOT	60% flights	+/-10 min
Call Count	Less 4 call p/f	
Occupation Ratio		
Runway Throughput		
G/S Availability		
+10 MORE KPI		

A-CDM Level 3 ATFM Network Connection		
Metric	**Target**	**Tolerance**
ELDT-ALDT	75% flights	+/-5 min
ETTT-ATTT	75% flights	+/-5 min
TSAT-AOBT	75% flights	+/-5 min
TTOT-ATOT	75% flights	+/-5 min
Call Count	Less 2 call p/f	
Occupation Ratio		
Runway Throughput		
G/S Availability		
+20 MORE KPI		

A-CDM Level 4 Operational Efficiency		
Metric	**Target**	**Tolerance**
ELDT-ALDT	50% flights	+/-3 min
ETTT-ATTT	50% flights	+/-3 min
TSAT-AOBT	50% flights	+/-3 min
TTOT-ATOT	50% flights	+/-3 min
Call Count	Less 1 call p/f	
Occupation Ratio		
Runway Throughput		
G/S Availability		
+30 MORE KPI		

Figure 7~~9~~ – Performance Framework example

In Figure 8~~Figure 10~~ below, the list of draft KPI, Metrics and tolerances are listed according to the ACDM Level Status

Key Performance Indicator	Metric	Level 1 Targ	Level 1 Toleran	Level 2 Targe	Level 2 Toleran	Level 3 Targe	Level 3 Toleran
KPI01 - Landing Time predictability	ELDT - ALDT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI01 - Landing Time predictability	# ELDT Updates from EOBT - 3 hr	5		3		1	
KPI02 - Taxi In Time predictability	EXIT - AXIT	0	-5, +5 min	0	-3, +3 min	0	-1, +1 min
KPI03 - In-Block Time predictability	EIBT - AIBT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI04 - Turnround Time predictability	ETTT - ATTT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI05 - Aircraft Ready predictability	TOBT - ARDT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI05 - Aircraft Ready predictability	TOBT initial - TOBT final	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI05 - Aircraft Ready predictability	# TOBT updates after EOBT - 3 hr	5		3		1	
KPI06 - Pushback & Start-up predictability	TSAT - AOBT	5	-10, +10 min	3	-5, +5 min	2	-3, +3 min
KPI06 - Pushback & Start-up predictability	TSAT - ASAT	0	-10, +10 min		-5, +5 min		-3, +3 min
KPI06 - Pushback & Start-up predictability	TSAT - ASRT	-2	-10, +10 min	-2	-5, +5 min	-2	-3, +3 min
	# TSAT expired %	5%		3%		2%	
	# TSAT Updates after EOBT - 3 hr	5		3		1	
KPI07 - Ready Reaction Time predictability	ERRT - ARRT	5		3		3	
KPI08 - Taxi-Out Time predictability	EXOT - AXOT	0	-5, +5 min	0	-3, +3 min	0	-1, +1 min
KPI09 - Take-Off Time predictability	TTOT - ATOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI10 - ATFM Slot predictability	TTOT - CTOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI11 - Number of stand/gate changes	# changes after EOBT - 3 hr	3%		1%		1%	
KPI12 - Stand/gate availability	# flights stop and wait during taxi-in	3%		1%		1%	
KPI13 - Traffic demand predictability	# flights with TTOT vs ATOT	100%		100%		100%	
KPI14 - Radio Telephony frequency congestion	# flights with ASRT < TSAT - tolerance %	5%		3%		0%	
KPI14 - Radio Telephony frequency congestion	% time congested frequency	10%		5%		0%	
KPI15 - Stand/gate occupation ratio	AIBT - AOBT per day						
KPI16 - Ground service resource availability	# Delay minutes IATA code 34						
KPI17 - Runway utilisation fraction	# minutes delay due to runway separation						
KPI18 - Induced start-up delay	Spread of TSAT - TOBT						
KPI19 - Total ATFM delay	CTOT - TTOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI20 - Number of ATFM slots	# CTOT in %						
KPI21 - Average ATFM delay	Sum of CTOT - TTOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI22 - Arrival punctuality	SIBT - AIBT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI23 - Start-up delay	TSAT - TOBT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
	CTOT - TTOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI24 - Departure punctuality	SOBT - AOBT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI25 - Take-off punctuality	TTOT - ATOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI26 - Time recovery	# (AIBT-SIBT) – (AOBT-SOBT) > 0	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI27 - Departure airport slot adherence	EOBT - SOBT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min
KPI28 - ATFM slot adherence	CTOT - ATOT	0	-10, +10 min	0	-5, +5 min	0	-3, +3 min

Figure 8~~10~~ – Level Tolerance values

D Predictability and Punctuality

This Annex explores the differences between punctuality and predictability, as distinction between two strategic objectives with multiple business drivers and performance indicators as used and referenced throughout the document.

D 1 Punctuality

Punctuality is considered the adherence to the schedule created by a flight operator, and often the single most relevant strategic objective steered on by stakeholders. Punctuality can be assessed post-operationally by comparing actual operation with scheduled flight times. Reporting therefor serves business performance for both airlines and ground handlers.

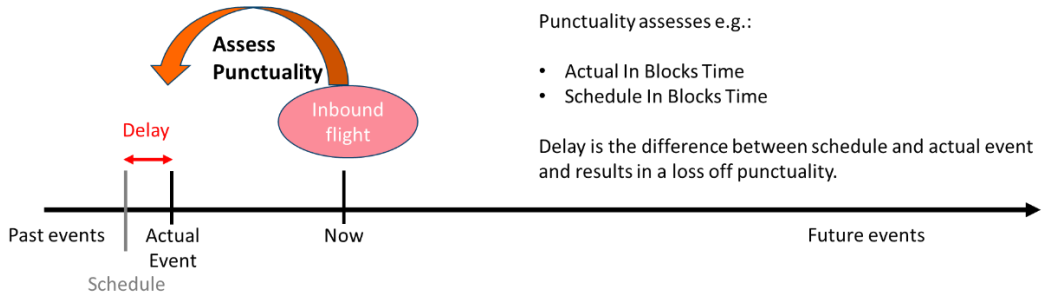


Figure ~~9~~18 Punctuality is assessed backwards, when the actual event has occurred.

Punctuality can also be assessed during operations through:

- Assessment of intermediate and past performance: actual versus scheduled times on flight waypoints.
- Expected punctuality on future waypoints, and assessing that expectation with flight plan data.
- Expected punctuality on future waypoints however are subject to uncertainty as the event still need to take place.

In general, Punctuality is a backward assessment on a completed flight segment. And a completed segment can be assessed for accuracy comparing to actual timestamp.

Examples

- Airlines assess punctuality as comparison of schedule off block time (SOBT or STD) with actual (AOBT or ATD).
- Ground handlers assess punctuality as comparison of estimated off block time (EOBT or ETD) with actual (AOBT or ATD).

D 2 Predictability

Predictability is a dynamic forward assessment on a future event serving ongoing operations. Predictability can therefore be a future assessment of potential gain or loss of punctuality, though uncertainty applies since the actual time stamp of the future event is not yet known. To compensate for this, we can use KPI monitoring post-operation to verify accuracy of predictions (e.g. TTOT compliance).

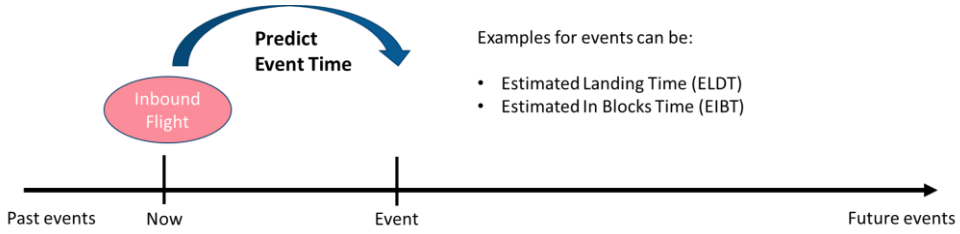


Figure 10~~19~~ Predictability is assessed forwards, when the event is yet to occur.

Examples

- Air traffic control assess multiple estimations of the landing time (ELDT) at the runway, and update throughout flights, with the actual (ALDT).
- Airports assess multiple estimations of the in-block time (EIBT) at the gate, and update throughout flights, with the actual (AIBT) based on ELDT.
- Ground Handler or Airport assess multiple predictions of the target off-block time (TOBT) based on ELDT and EIBT as well as turnround progress.

D 3 Relationship Punctuality and Predictability

Punctuality and Predictability are complementary and should not be confused or considered to be the same. Consequently, they have separate business drivers and key performance indicators as determine in section AB.

Predictability complements Punctuality through its impact. Punctuality is the intended schedule of the operation, and provides post-operation analysis for reporting purpose. Prediction information enables decision making during operation to all stakeholders, and can improve punctuality for flight in progress.

D 4 Accuracy and Reliability

The accuracy of a prediction determines its reliability, or confidence level for stakeholders. Predictability is the continuous process that enables accurate predictions through frequent updating, enhancing stakeholder confidence in the accuracy of the data and therefore on their decision to act upon the prediction. For each flight punctuality can be lost due to a delaying factor, yet an accurate prediction for future waypoints enables adjustment of resource and capacity planning.

The predicted delay of an inbound flight might impact the operation of the outbound flight as presented in **Figure 11**~~Figure 4~~. When this is managed through standard buffers in flight schedules (designed to compensate for unscheduled delays) it can be a costly and inefficient way to manage an aircraft. To enhance efficiency and potentially reduce flight schedule buffer time, airspace capacity buffers, or gate planning buffers, predictability is the new strategic objective to steer on through performance monitoring.

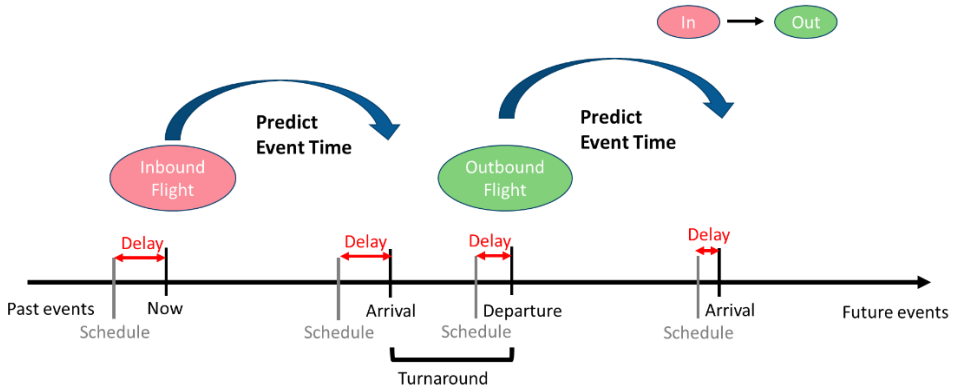


Figure 1120 Dependency on predictions

For most (but not all) processes applies that there is a proper and detailed planning of the operation (schedule or timetable) including resources. These are coordinated or at least communicated between the actors in the planning phase, so that a smooth operation is theoretically possible;
Problems and challenges arise if one (or more) deviations from the plan occur. That can be delays in one process or the non-availability of the planned resource, which leads to delays or even disruptions of the planned follow up services.

Accuracy and reliability are essential to improve situational awareness and to regain trust from stakeholders and clients. The more stakeholders participate in A-CDM, data sharing, compliance and adherence according to procedures, the higher the benefits will become for all stakeholders.

E Using the framework to improve performance

Purpose of this section is to describe how airports and recognition enables airports to improve ACDM performance.

E 1 Motivation

The following conditions may be considered motivating factors for airport and stakeholders to set-up more active steering on performance:

1. The airport monitors performance and observes consistent non-adherence of tolerances on key performance indicators.
2. The airport has a history of discussions with stakeholders without change of behaviour impacting operational performance
3. Unchanged or deteriorating performance differences from target values

E 2 Principles

The following principles could and should be guiding the airport and its stakeholders to adopt a method for steering on performance effectively:

- Determine strategic objectives and business drivers
- Determine key performance indicators and target values to achieve within reasonable period
- Determine KPI tolerance values to adhere and the adherence period
- Communicate the need for change of stakeholder behaviour
- Enable the change of stakeholder behaviour through training and available functionality

E 3 Steering Method

Describe in this section the generic concept of a steering methods such as First Come First Served and Best Planned Best Served.

E 3.1 Definition

Determine a coherent and consistent broad supported definition. Define Best Planned Best Served.

Best Planned Best Served is the reward of stakeholders providing accurate and timely flight predictions compared to actual flight events through incentives.

Flight predictions are at minimum the

1. Estimated Off-Block Time (EOBT)
2. Target off-block time (TOBT)
3. Target Start-Up Approval Time (TSAT)
4. Target Take-Off Time (TTOT)

Furthermore, actual events such as

1. Actual Start-Boarding Time (ASBT),
2. Actual End of Ground Handling Time (AEGT)
3. Actual Ready for Departure Time (ARDT)
4. Actual Off-Block Time (AOBT)
5. Actual Take-Off Time (ATOT)

In case of de-icing operations, where applicable:

6. Actual Commencement of De-icing Time (ACZT)
7. Actual End of De-icing Time (AEZT)

E 3.2 Tolerances

Tolerance values are margins of error of the target value, compared to the later actual value. Such tolerances should be set for multiple flight to evaluate the average performance of a stakeholder over a period, to rule out incidents or outliers.

Tolerances are set around a value, with a minus and plus tolerance. For early predictions such as flight schedule SOBT different tolerance values are set than for flight plan EOBT or operational target TOBT.

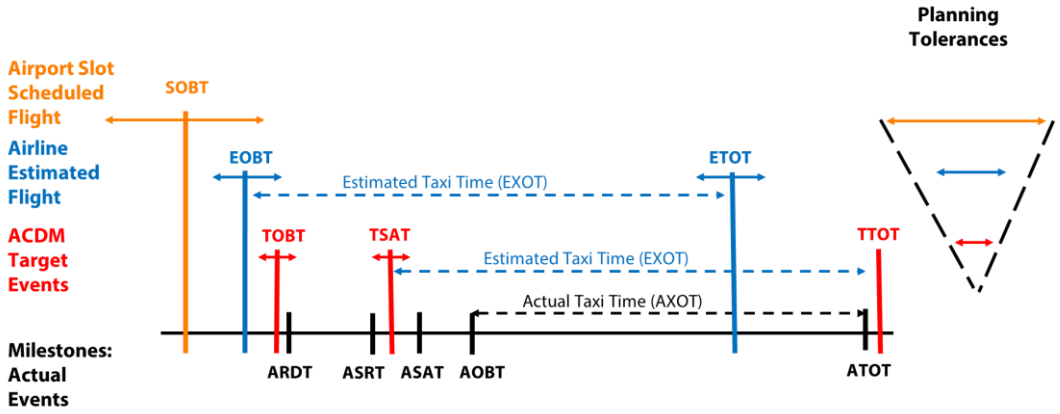


Figure 12~~11~~ - tolerance values for different flight schedule, estimation, and target values

E 4 Steering Concept

Determine a steering concept for Best Planned Best Served.

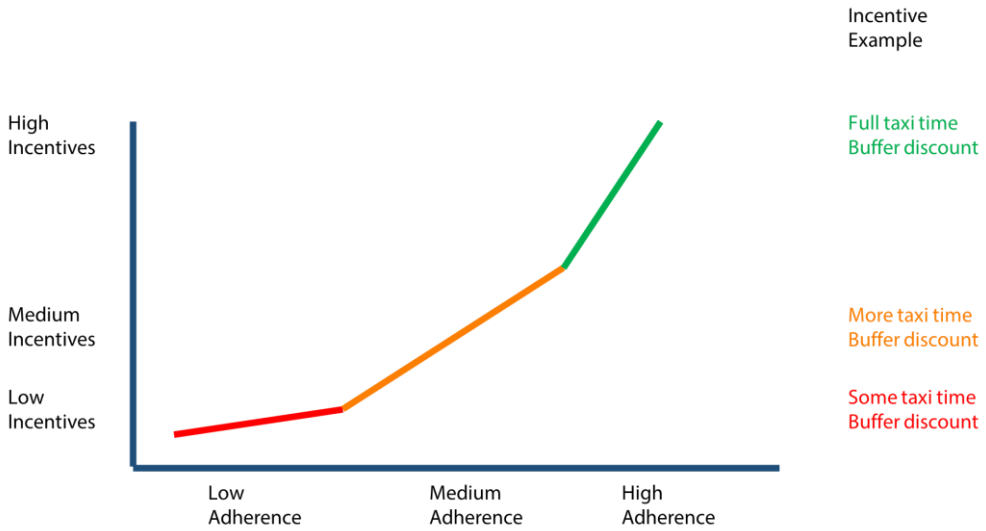


Figure 13~~12~~ – Incentives for adherence to procedures and tolerances

E 5 Decision Making

Describe who should decide on performance.

F Performance Indicators

This Annex provides an outline of the relationship between strategic objectives that generate business drivers for the stakeholders and key performance indicators that can be measured using metrics and collected data from commonly agreed data sources.

F 1 Structure

The general structure for performance monitoring is provided in **Error! Reference source not found.**~~Figure 11~~

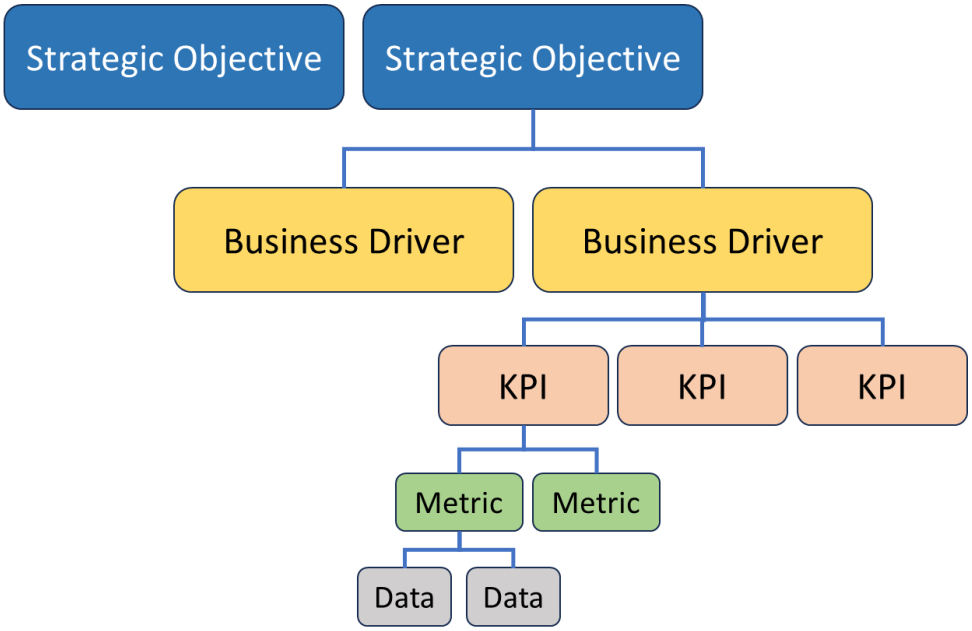


Figure 14~~13~~ – Performance framework structure

F 2 Strategic Objectives

For effective steering on performance, the strategic objectives (SO) need to be determined to determine whether change, progress and benefits are achieved. For A-CDM performance these can be taken from the Eurocontrol A-CDM Manual or other reference documentation.

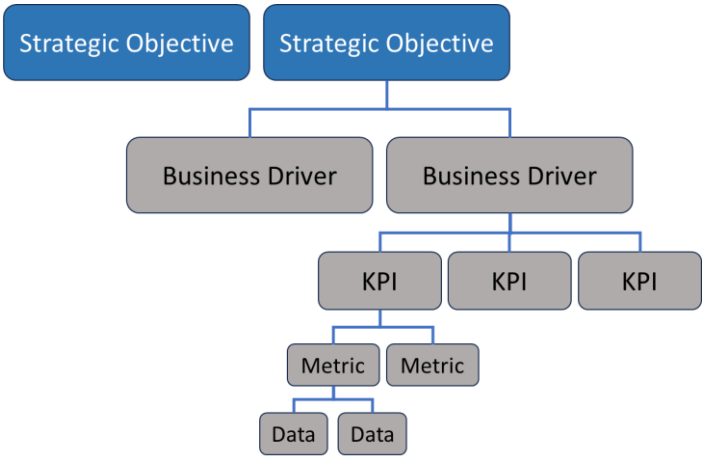


Figure 15~~14~~ – Strategic Objectives

The Strategic Objectives for A-CDM are:

- SO1 - Improve Predictability

- SO2 - Improve Resource Efficiency
- SO3 - Improve Capacity Robustness
- SO4 - Reduce ATFM Delay
- SO5 - Improve Punctuality

F 3 Business Drivers

Changes in performance can be distinguished when different business drivers are monitored, reflecting a broad range of operations and stakeholders.

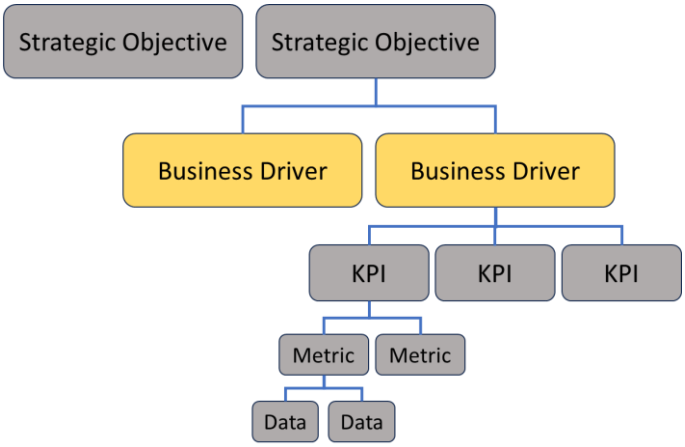


Figure 16~~15~~ - Business Drivers

The Business Drivers for A-CDM are determined for each Strategic Objective:

SO1 - Improve Predictability

- BD1 – Improve Arrival Predictability
- BD2 – Improve Turnround Predictability
- BD3 – Improve Departure Predictability
- BD4 – Improve Stand Allocation Stability

SO2 - Improve Resource Efficiency

- BD5 – Reduce ATC workload
- BD6 – Improve Ramp and Gate utilisation
- BD7 – Improve turnround resource utilisation

SO3 - Improve Capacity Robustness

- BD8 – Improve Capacity utilisation efficiency

SO4 - Reduce ATFM Delay

- BD9 – Reduce Total ATFM Delay
- BD10 – Reduce Average ATFM Delay

SO5 - Improve Punctuality

- BD11 – Improve On-Time Performance (OTP)
- BD12 – Reduce Reactionary Delay
- BD13 – Improve Slot Compliance

F 4 Key Performance Indicators

Changes in performance can be detected on stakeholder level when different performance indicators are monitored reflecting detailed stakeholder behaviour.

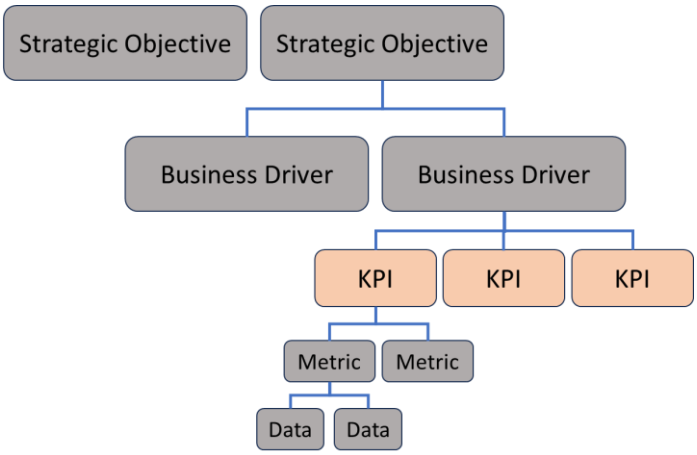


Figure 17~~16~~ – Key Performance Indicators

The Key Performance Indicators for A-CDM are determined for each Business Driver:

BD1 – Improve Arrival Predictability

- KPI01 - Landing Time predictability
- KPI02 – Taxi-In Time predictability
- KPI03 - In-Block Time predictability

BD2 – Improve Turnround Predictability

- KPI04 - Turnround Time predictability

BD3 – Improve Departure Predictability

- KPI05 - Aircraft Ready predictability
- KPI06 - Pushback & Start-up predictability
- KPI07 - Ready Reaction Time predictability
- KPI08 - Taxi-Out Time predictability
- KPI09 - Take-Off Time predictability
- KPI10 - ATFM Slot predictability

BD4 – Improve stand allocation stability

- KPI11 - Number of stand/gate changes
- KPI12 - Stand/gate availability

BD5 – Reduce ATC workload

- KPI13 - Traffic demand predictability
- KPI14 - Radio Telephony frequency congestion

BD6 – Improve stand/gate use

- KPI15 - Stand/gate occupation ratio

BD7 – Improve use of turnaround resources

- KPI16 - Ground service resource availability

BD8 – Improve capacity utilisation efficiency

- KPI17 - Runway utilisation fraction
- KPI18 - Induced start-up delay

BD9 – Reduce total ATFM delay

- KPI19 - Total ATFM delay
- KPI20 - Number of ATFM slots

BD10 – Reduce average ATFM delay

- KPI21 - Average ATFM delay

BD11 – Improve on-time performance

- KPI22 - Arrival punctuality
- KPI23 - Start-up delay
- KPI24 - Departure punctuality
- KPI25 - Take-off punctuality

BD12 – Reduce reactionary departure delay

- KPI26 - Time recovery

BD13 – Improve slot compliance

- KPI27 - Departure airport slot adherence
- KPI28 - ATFM slot adherence

F 5 Metrics

For metrics and data elements more details can be found in references such as Eurocontrol A-CDM Implementation Manual (reference 4). The metrics are determined for each KPI.

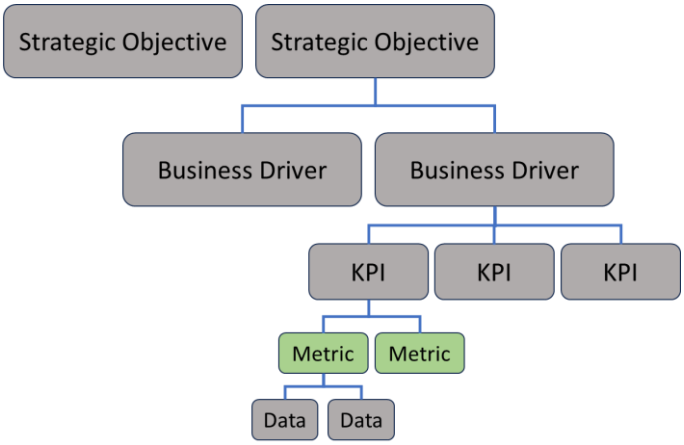


Figure 18~~17~~ – Metrics